

CLAIMS

1. A method for producing a photonic crystal in which a first dielectric and a second dielectric different in relative dielectric constant from said first dielectric are periodically arrayed, characterized by comprising the steps of:

 fabricating a first composite dielectric in which said first dielectric and said second dielectric are periodically arrayed in one and the same plane; and

 laminating on said first composite dielectric a second composite dielectric in which said first dielectric and said second dielectric are periodically arrayed in one and the same plane.

2. The method for producing a photonic crystal according to claim 1, characterized in that said first dielectric is a dielectric ceramic and said second dielectric is air.

3. The method for producing a photonic crystal according to claim 2, characterized in that a dielectric block having a predetermined pattern of openings periodically arrayed is obtained by laminating said first composite dielectric and said second composite dielectric, wherein each of said composite dielectrics has holes which penetrate along the thickness direction thereof and are formed in a predetermined pattern.

4. The method for producing a photonic crystal according to claim 3, characterized in that said predetermined pattern of openings penetrate through said dielectric block from the front surface to the back surface thereof, and air as said second dielectric is placed in the openings.

5. The method for producing a photonic crystal according to claim 1, characterized in that said first composite dielectric and said second composite dielectric are each obtained by perforating holes in a sheet-like member.

6. The method for producing a photonic crystal according to claim 1, characterized in that said first composite dielectric and said second composite dielectric are obtained by use of a printing technique.

7. The method for producing a photonic crystal according to claim 6, characterized in that lamination of said first composite dielectric and said second composite dielectric is carried out by use of said printing technique.

8. The method for producing a photonic crystal according to claim 1, characterized in that said first dielectric and said second dielectric each are a dielectric ceramic.

9. The method for producing a photonic crystal according to claim 8, characterized by further comprising the steps of:

laminating said first composite dielectric and said second composite dielectric to obtain a dielectric block having a predetermined pattern of openings periodically arrayed wherein each of said composite dielectrics is sheet-like and has holes which penetrate along the thickness direction thereof and are formed in a predetermined pattern; and

arraying said second dielectric in said openings.

10. The method for producing a photonic crystal according to claim 9, characterized in that a powder slurry comprising said second dielectric is filled in the openings of said dielectric block.

11. The method for producing a photonic crystal according to claim 10, characterized in that filling of said powder slurry is carried out by suction or pressurization.

12. The method for producing a photonic crystal according to claim 9, characterized in that said predetermined pattern of openings penetrate through said dielectric block from the front surface to the back surface thereof.

13. The method for producing a photonic crystal according to claim 10, characterized in that a powder slurry comprising said second dielectric is filled in said openings of said

dielectric block, and thereafter said first dielectric and said second dielectric are co-fired.

14. The method for producing a photonic crystal according to claim 9, characterized in that said first composite dielectric and said second composite dielectric each have a thickness from 1 to 800 μm .

15. The method for producing a photonic crystal according to claim 8, characterized in that said first composite dielectric and said second composite dielectric each are a ceramic composite, and said ceramic composite is fabricated by:

arraying a first ceramic composition constituting said first dielectric on the sites corresponding to said first dielectric; and

arraying a second ceramic composition constituting said second dielectric on the sites corresponding to said second dielectric.

16. The method for producing a photonic crystal according to claim 15, characterized in that a plurality of said ceramic composites are laminated, wherein said plurality of said ceramic composites are obtained by arraying said first ceramic composition and thereafter arraying said second ceramic composition.

17. The method for producing a photonic crystal according to claim 15, characterized in that:

said ceramic composite is fabricated by arraying said first ceramic composition and thereafter arraying said second ceramic composition; and

said ceramic composite is laminated by repeating the step of arraying any one of said first ceramic composition and said second ceramic composition on said ceramic composite, and thereafter arraying the other of said first ceramic composition and said second ceramic composition thereon.

18. The method for producing a photonic crystal according to claim 16 or 17, characterized by further comprising a step of firing the laminated body formed of said ceramic composite.

19. The method for producing a photonic crystal according to claim 1, characterized in that said photonic crystal has a two-dimensional periodic structure.

20. A photonic crystal in which a first block-like dielectric and a cylindrical second dielectric different in relative dielectric constant from said first dielectric are arrayed in a predetermined period, the photonic crystal being characterized in that:

said first dielectric and said second dielectric each are formed of a dielectric ceramic; and

said second dielectric is constituted with a plurality of cylindrical members of 2 mm or less in diameter, and said second dielectric is arrayed with a predetermined interval so as to penetrate through said first dielectric from the front surface to the back surface thereof.

21. A photonic crystal comprising a first dielectric and a second dielectric different in relative dielectric constant from said first dielectric, said first dielectric and said second dielectric being arrayed with a predetermined period, characterized in that:

said first dielectric is constituted with a dielectric block comprising a dielectric ceramic with openings of 2 mm or less in diameter, the openings being formed in a predetermined pattern; and

said second dielectric is constituted with the air present in said openings.

22. The photonic crystal according to claim 20 or 21, characterized in that said photonic crystal has a two-dimensional periodic structure.